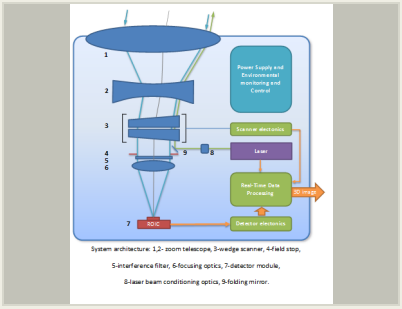
A Next Generation Imaging for Space Application, Phase I

Completed Technology Project (2015 - 2015)

Project Introduction

The proposal describes a next generation 3D imaging lidar (IML) suitable for a uniquely wide range of space applications - from orbital mapping and proximity operations of small bodies such as asteroid and comets, to full scale entry, decent and landing operations on other planetary bodies. Low Earth Orbit operations such as rendezvous and docking between spacecraft, and space debris search and collection can also be accommodated. Such versatility is made possible system by a system architecture which merges the architectures of two high performance imaging lidars - the Sigma Space 3D Imaging Lidar and the Imaging Lidar for planetary landing developed by the European Space Agency. The result is a highly modular architecture that is scalable and "open" in terms of future development of the underlying technologies thus providing a path for reusable NASA investment. The design combines several advanced technologies which have matured independently of each other into a state-of-the-art system with performance parameters and flexibility greatly exceeding those of the existing instruments. Its key advantage is the operation at the ultimate single photon sensitivity level which minimizes instrument Size, Weight, and Power (SWAP). It is combined with other useful features such as high spatial and range resolution, wide FOV, highly flexible scanning with variable field of regard (FOR), autonomous target acquisition and tracking, and programmable surface measurement rates up to several 3D Megapixels per second (Mpix/s) during orbital mapping and spacecraft entry, descent and landing operations. It advances the state of the art by extending the range of 3D measurements from 10m to 10km, improving the measurement accuracy and the spatial resolution and significantly reducing the impact of incorporating such sensors on the spacecraft in terms of SWAP, spacecraft accommodation complexity, and cost.



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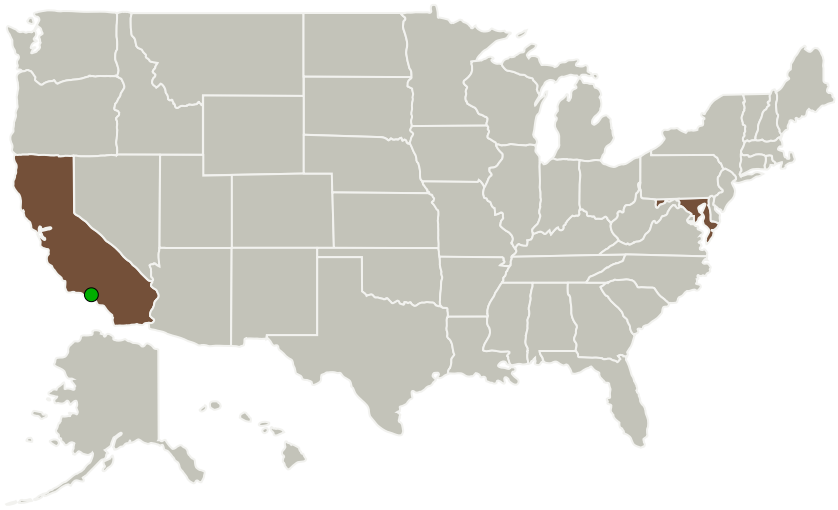
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Sigma Space Corporation	Lead Organization	Industry Small Disadvantaged Business (SDB)	Lanham, Maryland
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Maryland

Project Transitions

June 2015: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Sigma Space Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

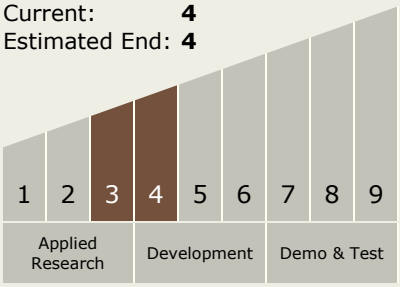
Carlos Torrez

Principal Investigator:

Ivelin Bakalski

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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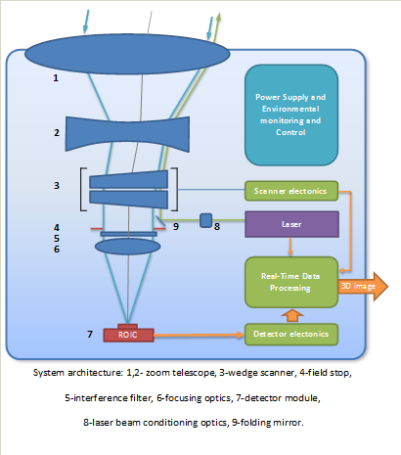
December 2015: Closed out

Closeout Summary: A Next Generation Imaging for Space Application, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138745)*

Images



Briefing Chart Image
A Next Generation Imaging for Space Application, Phase I *(https://techport.nasa.gov/image/127937)*

Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.1 Situational and Self Awareness
    - TX10.1.2 State Estimation and Monitoring

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System